CLAIMS

We claim:

A device for removing contaminants from a natural gas stream, the device comprising:

first adsorbent means positioned within a first fluidized bed operating at a first predetermined temperature for removing at least a portion of the contaminants from the natural gas stream and creating a partially sweetened natural gas stream; and

second adsorbent means positioned within a second fluidized bed operating at a second predetermined temperature for receiving the partially sweetened natural gas stream, the second adsorbent means removing at least a portion of the contaminants from the partially sweetened natural gas stream.

- 2. The device of claim 1 wherein the contaminants are selected from the group consisting of H₂S, CO₂, and H₂O.
- 3. The device of claim 1 wherein the first adsorbent means is a molecular sieve.
- The device of claim 1 wherein the second adsorbent means is a molecular sieve. 4.
- 5. The device of claim 1 wherein the first predetermined temperature is greater than the second predetermined temperature.
 - 6. The device of claim 1 wherein the first predetermined temperature is between approximately twenty (20°) degrees C and approximately sixty (60°) degrees C.
- 25 7. The device of claim 6 wherein the first predetermined temperature is approximately twenty-five (25°) degrees C.
 - 8. The device of claim 1 wherein the second predetermined temperature is between approximately one hundred (100°) degrees C and approximately three hundred (300°) degrees C.

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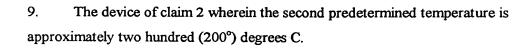
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- 5 10. The device of claim 1 and further comprising:

 conversion means for converting H₂S within the removed contaminants to

 elemental sulfur and hydrogen at a predetermined temperature less than

 approximately four hundred (400°) degrees C.
- 10 11. The device of claim 10 wherein the conversion means is a nonthermal plasma corona reactor.
 - 12. An apparatus for converting H₂S to elemental sulfur and hydrogen, the apparatus comprising:

conversion means for receiving H₂S and for converting H₂S to elemental sulfur and hydrogen at a predetermined temperature less than approximately four hundred (400°) degrees C.

- 13. The apparatus of claim 12 wherein the conversion means is a nonthermal plasma corona reactor.
 - 14. The apparatus of claim 12 and further comprising: adsorbent means positioned within a fluidized bed for removing at least a portion of H₂S from a natural gas stream; and means for providing the removed H₂S to the conversion means.
 - 15. The apparatus of claim 14 wherein the adsorbent means includes a first adsorbent having a first predetermined temperature and second adsorbent having a second predetermined temperature.
- 16. The apparatus of claim 15 wherein the first adsorbent means and the second adsorbent means are a molecular sieves.
- 17. The apparatus of claim 15 wherein the first predetermined temperature is

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greater than the second predetermined temperature.

18. A method for removing H₂S and other contaminants from a natural gas stream and converting H₂S to elemental sulfur and hydrogen, the method comprising:

providing first adsorbent means;

positioning the first adsorbent means within a fluidized bed at a first predetermined temperature;

introducing the natural gas stream to the first adsorbent means thereby removing at least a portion of the H₂S and other contaminants from the natural gas stream and creating a partially sweetened natural gas stream;

providing second adsorbent means;

positioning the second adsorbent means within a fluidized bed at a second predetermined temperature;

introducing the partially sweetened natural gas stream to the second adsorbent means thereby removing at least a portion of the contaminants from the partially sweetened natural gas stream;

providing a nonthermal plasma reactor;

introducing the removed contaminants to the nonthermal plasma reactor; and converting the H₂S to elemental sulfur and hydrogen at a third predetermined temperature.

- 19. The method of claim 18 wherein the first adsorbent means and the second absorbent means are molecular sieves.
- 25 20. The method of claim 18 wherein the first predetermined temperature being greater than the second predetermined temperature.
 - 21. The method of claim 18 wherein the first predetermined temperature being between approximately twenty (20°) degrees C and approximately sixty (60°) degrees C.
 - 22. The method of claim 18 wherein the second predetermined temperature being between approximately one hundred (100°) degrees C and approximately three hundred (300°) degrees C.

23. The method of claim 18 wherein the third predetermined temperature being less than approximately four hundred (400°) degrees C.